

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-016993

(43)Date of publication of application : 20.01.1995

(51)Int.Cl.

B32B 27/12  
B32B 27/08  
B32B 27/28  
B32B 27/32  
B32B 27/32

(21)Application number : 06-002697

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(22)Date of filing : 14.01.1994

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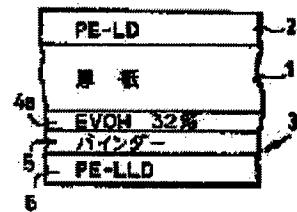
Priority number : 93 932875 Priority date : 21.06.1993 Priority country : FI

## (54) MULTILAYERED PRODUCT

(57)Abstract:

PURPOSE: To prevent the generation of a pinhole and to keep sufficient airtightness by forming the barrier plastic layer in a multilayered structure in the closest vicinity to a fiber base packaging material layer.

CONSTITUTION: In a multilayered product, especially, a multilayered product for producing container, a layer 1 molded from a fiber base packaging material is provided on one surface of an airtight multilayered plastic coating 3. The airtight multilayered plastic coating 3 is molded from a barrier plastic layer 4a of 1-4 g/m<sup>2</sup> produced from a 32% ethylene/vinyl alcohol copolymer material, a binder layer 5 of 1-4 g/m<sup>2</sup> produced from acid modified low density polyethylene and a surface layer 6 comprising a heat-sealable polyolefin material, for example, linear low density polyethylene having thickness sufficient for liquidtight heat-sealing all of which are superposed one upon another. The barrier plastic layer 4a in this multilayered structure is arranged in closest vicinity to the fiber base packaging material layer 1.



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## CLAIMS

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### [Claim(s)]

[Claim 1]A layer (1) fabricated from fiber base material wrapping a layered product and on the surface of one of these where it is a layered product for container manufacture especially, and airtight multilayer plastic coating (3) is arranged is included, This airtight multilayer plastic coating (3), an interception plastic layer (4a and 4b.) of 1 piled up – 4 g/m<sup>2</sup>Binder layer (5) of 4 [ 4c, 4d, 4e, 1 – ] g/m<sup>2</sup> Reach, The above-mentioned layered product which is fabricated from a surface (6) of polyolefine material which can be heat sealed which has sufficient thickness for fluid dense heat sealing, and is characterized by being what has this interception plastic layer most in the neighborhood to this fiber base material wrapping layer (1) among these layers.

[Claim 2]The layered product according to claim 1 in which an interception plastic layer (4a, 4b, 4c, 4d, 4e) is directly applied to a fiber base material wrapping layer (1).

[Claim 3]The layered product according to claim 1 in which a smooth layer (7) is arranged between an interception plastic layer (4a, 4b, 4c, 4d, 4e) and a fiber base material wrapping layer (1).

[Claim 4]A layered product given in any 1 paragraph of claims 1–3 by which an interception plastic layer (4a) is manufactured from ethylene vinyl–alcohol–copolymer material 32%.

[Claim 5]A layered product given in any 1 paragraph of claims 1–3 by which an interception plastic layer (4b) is manufactured from a compound of ethylene vinyl alcohol copolymer and mica.

[Claim 6]A layered product given in any 1 paragraph of claims 1–3 by which an interception plastic layer (4c) is manufactured from a compound of ethylene vinyl alcohol copolymer and CO group content ethylene polymer.

[Claim 7]A layered product given in any 1 paragraph of claims 1–3 by which an interception plastic layer (4d) is manufactured from a compound of ethylene vinyl alcohol copolymer and polyamide.

[Claim 8]A layered product given in any 1 paragraph of claims 1–3 by which an interception plastic layer (4e) is manufactured from thermoplastic polyester or thermoplastic copolyester.

[Claim 9]A layered product given in any 1 paragraph of claims 1–8 by which a binder layer (5) is manufactured from acid denaturation low density polyethylene.

[Claim 10]A layered product given in any 1 paragraph of claims 1–9 by which a smooth layer (7) is manufactured from a binder layer (5) and an identical material.

[Claim 11]A layered product given in any 1 paragraph of claims 1–10 whose surface (6) polyolefine materials are linear low density polyethylene.

[Claim 12]A layered product given in any 1 paragraph of claims 1–11 whose surface (6) polyolefine materials are low density polyethylene.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application]This invention relates to a layered product and the above-mentioned layered product which is layered products for container manufacture and contains especially the layer fabricated from fiber base material wrapping on the surface of one of these where airtight multilayer plastic coating is arranged.

#### [0002]

[Description of the Prior Art]The layered product of the above-mentioned kind is common knowledge very much about the container for fruit juice of citruses today, for example. Fiber base material material is pasteboard in many cases. The solution indicated by the European patent application No. 0293098 specification is an example of advanced-technology solution.

[0003]About advanced-technology solution, the manufacturing process of a container, and when a plastic surface was heat sealed especially mutually, the problem that a pinhole might produce in multilayer plastic coating arose. A pinhole is a problem especially when the hole produces in the inner surface of a container. although sufficient airtightness of plastic coating has a micro hole -- coating -- a fluid -- since gas flow may arise via this micro hole even if dense, it is spoiled a little in that case.

[0004]The pinhole of plastic coating is a result of saying [ the elevated temperature especially applied to KOTIGU on the occasion of heat sealing softening a plastic layer, and fusing selectively ]. I hear that pasteboard is also heated in a seal zone, the moisture in pasteboard tends to permeate the plastic layer which was softened for steam pressure and fused selectively, and another reason of the pinhole tends to produce the pinhole in coating by it, and there is. In practice, a pinhole produces still more easily, so that the moisture content in pasteboard is so high that heat-sealing temperature is high. The steam pressure in pasteboard tends to burst the plastic layer applied to pasteboard in the spot form of a dot. A burst location turns into the starting point of a pinhole.

#### [0005]

[Means for Solving the Problem]The purpose of this invention is to provide a layered product which can eliminate a fault of advanced technology. By choosing a kind of plastic in which a HITO seal for multilayer structure is possible about this invention, so that it can heat seal at low temperature showed that a pinhole could be decreased and it could prevent still more nearly thoroughly. A plastic layer does not soften, and the solution to and selection of a plastic layer by the above-mentioned result which does not spoil those intensity easily to the same extent follow, and bar a pinhole. In another side, steam pressure produced with moisture in pasteboard decreases. A pinhole can be prevented by choosing with ductility a plastic kind which is still a strong state at heat-sealing temperature as a plastic layer for applying to pasteboard. It is effective in a pinhole to choose as one of the layers further a plastic kind which is still a ductile state when heat sealing, and it obtains. An interception plastic layer of 1 on which airtight multilayer plastic coating put a layered product of this invention - 4 g/m<sup>2</sup>, It is fabricated from a binder layer of 1-4g/[m ]<sup>2</sup>, and a surface of polyolefine material which can be heat sealed which has sufficient thickness for fluid dense heat sealing, and is characterized by being what has this

interception plastic layer most in the neighborhood to this fiber base material wrapping layer among these layers.

[0006]An advantage of this invention which surpasses advanced technology is that intensity and ductility higher than before are attained about a layered product rather than anything first, and these character is held also at an elevated temperature which is used for heat sealing.

Therefore, this invention can be used also by coating thickness 15 to 30% less than before. It is essential that the adhesiveness between heat of a seal in the case of heat sealing and intensity are improved, and line velocity in the case of heat sealing increases to 10 to 20% by same cooking temperature and quantity of heat by it. This factor also decreases a pinhole of plastic coating. Another advantage of a layered product of this invention is that the environmental-stress-cracking-resistance nature ESCR is far superior to before. In a package of a difficult product, saving is important for this characteristic. For example, in a container for liquid detergent, when aiming at the storage time for about one year, high ESCR makes it possible to decrease total thickness of plastic coating to about 30%. Another advantage of this invention is high abrasion resistance. As a result, plastic dust does not arise with a high-speed container production line, and a blank advances on the line still more smoothly than before. In this relation, as an example, when using linear low density polyethylene, i.e., PE-LLD material, as a surface of multilayer plastic coating, it can mention that abrasion resistance is twice [ about ] the abrasion resistance of advanced-technology products, for example. Other above-mentioned advantages were explained mainly about a case where PE-LLD material is a layer material under aforementioned multilayer plastic coating.

[0007]Although a desirable embodiment shown in an attached drawing indicates this invention still in detail below, in there, drawing 1 – 6 show a desirable embodiment of a layered product of this invention.

[0008]Drawing 1 shows a first desirable embodiment of a layered product of this invention. The identification number 1 of drawing 1 shows fiber base material wrapping which is pasteboard and is obtained, for example. In this embodiment, the layer 2 of low-density-polyethylene PE-LD is given on one surface of pasteboard. The layer 2 is for giving an outside surface of a completion container. Since the PE-LD layer 2 can realize an outside surface of a completion container similarly by other methods, it is not indispensable. In the surface processed as an example so that it might be the lacquer surface or water repellence, or some, even the green cardboard surface can be mentioned.

[0009]In this embodiment, the airtight multilayer plastic coating 3 is applied to that surface for giving another surface of the pasteboard 1, i.e., an inner surface of a completion container. The multilayer plastic coating 3 is fabricated from the piled-up interception plastic layer 4a, the binder layer 5, and the surface 6 of polyolefine material which can be heat sealed.

[0010]In an embodiment of drawing 1, the interception plastic layer 4a is manufactured from an ethylene alcoholic copolymer material 32%, and the surface 6 which gives an inner surface of a container in order is manufactured from linear-low-density-polyethylene PE-LLD. The binder layer 5 may be acid denaturation PE-LLD, for example. In an embodiment of drawing 1, the layer thickness of various layers under multilayer plastic coating is as follows, That is, as for 1 – 4 g/m<sup>2</sup> and the binder layer 5, the interception plastic layer 4a is chosen so that fully [ 1 – 4 g/m<sup>2</sup> and thickness of the surface 6 ] for fluid dense heat sealing. Corresponding to a product in which it fills up with thickness of the layer 6, in the case of offensive substances, such as a detergent, it can change so that 20 g/m<sup>2</sup> may be exceeded, so that it may be less than 20 g/m<sup>2</sup> in the case of juice. Thickness of the PE-LD layer 2 of an opposite hand of pasteboard may be 20 g/m<sup>2</sup>, for example.

[0011]By the above-mentioned solution, coating much more convenient than the thin former and sufficient interception nature are obtained. As another advantage of solution by drawing 1, there are sufficient mechanical abrasion resistance, convenient ESCR, sufficient heat sealability, low seal temperature, and sufficient after-processing characteristic. Saving can use an embodiment by drawing 1 by an advantage about a difficult fluid further.

[0012]Drawing 2 shows another desirable embodiment of this invention. It uses in that an

embodiment of drawing 2 is intrinsically [ as an embodiment of drawing 1 ] in agreement, therefore the identification number same in drawing 2 as drawing 1 is corresponded. I hear that the interception plastic layer 4b of the airtight multilayer plastic coating 3 is manufactured from a compound of the ethylene vinyl alcohol polymer EVOH and mica, and the only difference with an example of drawing 1 has it. This compound is a substance of itself known, for example, is written still in detail in a U.S. Pat. No. 4818782 specification.

[0013]Mica gives sufficient adhesive property over pasteboard to EVOH in extrusion covering, and sufficient adhesive property decreases character in which it foams one by one. Mica increases intensity of EVOH and this applied intensity decreases character in which it is intrinsically important for and foams by it about a heat ceiling. Mica is a substance which has thermal conductivity higher than EVOH, therefore ceiling heat is not a forge fire easily accumulated into EVOH.

[0014]Mica gives sufficient gas barrier properties to EVOH, and is useful for reduction in diactinism. If recirculation is taken into consideration, an EVOH independent twist of EVOH+ mica is also much more practical.

[0015]With mica, heat-sealing temperature is [ in / blank production ] maintainable with the same level as a case where Al foil pasteboard is used, in a filling machine. Similarly, in the case of EVOH+ mica, an operation window for heat sealing is large on a par with a case where aluminum lamination pasteboard is used. When not using mica, it is necessary to reduce heat-sealing temperature to about 30 \*\*, and to also reduce an operation window to about 20 \*\*. However, when adding mica, steam pressure from moisture which can perform the process best at a lower part end of an operation window, therefore is contained in pasteboard is low, and does not produce a micro hole. When not using mica, it is thought that it is easy to generate a micro hole.

[0016]Drawing 3 shows a third desirable embodiment of this invention. An embodiment of drawing 3 is substantially [ as an embodiment of drawing 1 and drawing 2 ] in agreement. The only difference is that the interception plastic layer 4c is manufactured in an embodiment of drawing 3 from a compound of ethylene vinyl alcohol copolymer and CO group content ethylene polymer. At drawing 3, the same identification number as drawing 1 and drawing 2 is used in that it corresponds.

[0017]As mentioned above, in an embodiment by drawing 3, the interception plastic layer 4c is manufactured from a compound of ethylene vinyl alcohol copolymer and CO group content ethylene polymer, i.e., an EVOH+ECO compound. Melt strength of an ECO content EVOH plastic is higher than an EVOH plastic independent case. High melt strength is an important factor when extrusion covering is taken into consideration. Low melt strength of only EVOH causes a pinhole in an EVOH layer only by extrusion covering. This is a result of saying [ that textiles of pasteboard covered tend to break a weak melting EVOH layer ]. If ECO is added to EVOH to 30 % of the weight, for example, melt strength will be considerably improved, so that textiles do not produce a pinhole in a molten plastic thin film. As far as it is concerned, this enables application of EVOH+ECO to pasteboard directly.

[0018]High melt strength prevents a burst of an EVOH+ECO plastic in heat sealing, and prevents micro hole formation by it. Generally, an EVOH+ECO plastic layer is in heat sealing in the very strong and ductile state, and there are few the exploding tendencies substantially by it than an EVOH plastic independent case.

[0019]An EVOH independent twist also has little susceptibility [ as opposed to change of ambient humidity in EVOH+ECO ]. since this is reflected in the heat-sealing characteristic, steam pressure from pasteboard does not spoil intensity of a compound until comparable with a case of only EVOH. In one side, a fall of susceptibility to moisture is reflected also as a clear reduction of influence of ambient humidity on airtightness.

[0020]Drawing 4 shows a fourth desirable embodiment of this invention. An embodiment of drawing 4 is substantially [ as drawing 1 – an embodiment of three ] in agreement. An essential difference with a front embodiment is that 4 d of interception plastic layers are manufactured from a compound of ethylene vinyl alcohol copolymer and polyamide. At drawing 4, drawing 1 – the same identification number as an embodiment of three are used in that it corresponds.

[0021]In an embodiment of drawing 4, a filter layer is a compound of EVOH+PA, i.e., an EVOH plastic, and PA. Various compounds of EVOH and PA are known in itself, and these examples are in a U.S. Pat. No. 4952628 specification, a 5110855 specification, and a 5126401 specification. PA plastic is a powerful plastic very in ductility. Although the melting point of PA is 230–240 \*\*, the melting point of EVOH is 168 \*\*. The airtightness of PA is not equivalent to it of EVOH. By blending EVOH and PA, the following advantages are attained in a multilayer use. Intensity and ductility in extrusion covering and heat sealing are improved. For this reason, a pinhole is not produced in extrusion covering, in another side, an EVOH+PA layer is not torn for that ductility, or steam pressure is not passed. In heat sealing, an operation window is larger than an EVOH independent case 30 \*\*. When pulp molding is taken into consideration, it is a ductility past \*\* plastic only in PA. EVOH+PA of a suitable ratio is suitable solution when pulp molding is taken into consideration.

[0022]Drawing 5 indicates a fifth desirable embodiment of this invention. This embodiment is substantially in agreement with a front example. A difference with a front example is that the interception plastic layer 4e is manufactured from thermoplastic polyester or thermoplastic copolyester in this example. Examples of such a material are polyethylene terephthalate and polybutylene terephthalate. At drawing 5, the same identification number as a front embodiment is used in that it corresponds.

[0023]In an embodiment of drawing 5, an interception plastic is polyethylene terephthalate PET. Although the airtightness of PET is not equivalent to it of EVOH or PA, it is important that the interception nature of PET does not change according to ambient humidity. The heat resistance of PET is enough and the melting point is 255 \*\*. PET is at temperature which has sufficient strength property and exceeds 200 \*\* in the ductile state. Therefore, a micro hole is not produced in PET about heat sealing, and a pinhole is not further produced about extrusion covering. A PET plastic has sufficient adhesive property over pasteboard, only when quantity of PET coating is more than about 40 g/m<sup>2</sup> or it. However, a little PET coating can also attain an adhesive property by producing three-layer coating, using simultaneous extrusion covering. Each coating amount indicated about drawing 1 is suitable for drawing 2 – an embodiment of five.

[0024]I hear that even change of melt viscosity may cause remarkable instability in extrusion covering, and another character of a PET plastic has it. In three-layer extrusion covering, the instability of a PET plastic is compensated with other two-layer sufficient stability. Sufficient stability amends gram quantity change, and edge waiving of plastic coating is extinguished, and these factors give economy-of-production nature mutually to use of PET. Since a PET plastic is rigidity, it makes long-term storage possible, without improving the rigidity of a container and being accompanied by a blister. This is indispensable about a sterile container especially.

[0025]Also in any of the above-mentioned embodiment, an interception plastic layer is directly applied to the fiber base material wrapping layer 1. Such arrangement is convenient especially when smooth enough in a fiber base material wrapping layer. An example of such a material is the pasteboard which carried out hot calendering. When the surface of pasteboard is rough, it is preferred to make irregularity of the surface of pasteboard smooth with the application of a smooth layer on the surface of pasteboard, and a desirable effect is attained by the Paris Ya plastic layer of desirable thickness in that case. Textiles which stood straight on the surface coarsely in the bottom may run through the Paris Ya plastic layer easily, and may spoil efficiency of a finished product by it. The purpose of a smooth layer is to provide desirable efficiency, without completely needing to increase thickness of an interception plastic layer too much.

[0026]Drawing 6 shows an embodiment based on an embodiment of drawing 1. The smooth layer 7 is used for an embodiment of drawing 6 between the interception plastic layer 4a and the fiber base material wrapping layer 1. Although an embodiment of drawing 6 does not have a PE-LD layer on another surface of the layer 1, it applies a lacquer layer to this surface as mentioned above. Although a lacquer layer is not shown in drawing 6, it is clear that an embodiment by drawing 6 can be fabricated also from drawing 2 – an embodiment of five. A PE-LD layer applied to an outer layer of a completion container can be used about an embodiment which uses the smooth layer 7. The smooth layer 7 can be preferably manufactured from the binder layer 5 and

an identical material. Thickness of the smooth layer 7 may be less than thickness of a binder layer, and comparable, for example,  $3g/m^2$ , conveniently.

[0027]A multilayer-structure object of this invention can be manufactured by the following methods, for example. Although an embodiment of drawing 2 explains manufacture below, it is clear that all embodiments can be manufactured similarly. If a web of the pasteboard 1 covered is necessary, it can be processed to both sides by flame, corona, primer, or a plasma process. Pasteboard or paper processed beforehand is covered with one work by both sides as follows. That is, the PE-LD coating 2 of the surface which gives an outside surface to a completion container is attained by an extrusion method to flame treatment finishing pasteboard. The plastic coating 3 of an inner surface of a completion container is attained by one work by extruding all required layers at once, and three-layer coating shown in a drawing is obtained. Since this makes it possible to use low extrusion temperature, the heat sensitivity EVOH does not decompose it with heat. EVOH+ mica is supplied from an extrusion machine of its exclusive use, and, as for binder polymer, an extrusion machine of its exclusive use to PE-LLD is supplied from an extrusion machine of its exclusive use. Corona treatment of the outside surface of a pasteboard lamination covered in a described method is carried out, and it makes it possible to print ink of a printer, and heat sealing is improved. Other processings which strengthen printing, for example, printable glue ABURU (PrintableGlueable) (PG) processing, are possible. Thus, a manufactured pasteboard-plastic lamination can be heat sealed by an idiomatic method here.

[0028]Above-mentioned this invention is convenient especially as a material folded up by wrapping, for example, a cube, a rectangular parallelepiped, or a cylindrical vessel for citruses juice, water, and other liquid food things.

[0029]Although this invention indicated above is never restricted to a shown embodiment, this invention can completely be freely changed into a claim by written within the limits. Therefore, a layered product of this invention or its details do not necessarily need to be exact, as shown in a drawing, and other solution is possible for them. For example, although the layer 6 is not restricted to PE-LLD material, polyolefines of this layer may be low density polyethylene, high density polyethylene, polypropylene, polybutylene, etc., for example. Polyolefine material of the layer 6 may be a compound of a compound, for example, linear low density polyethylene, and low density polyethylene. Fiber base material wrapping does not necessarily need to be pasteboard, and other materials, for example, paper, plastic lining pasteboard, etc. are possible for it.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1]Drawing 1 shows the first desirable embodiment of the layered product of this invention.

[Drawing 2]Drawing 2 shows another desirable embodiment of this invention.

[Drawing 3]Drawing 3 shows the third desirable embodiment of this invention.

[Drawing 4]Drawing 4 shows the fourth desirable embodiment of this invention.

[Drawing 5]Drawing 5 shows the fifth desirable embodiment of this invention.

[Drawing 6]Drawing 6 shows the embodiment based on the embodiment of drawing 1.

[Description of Notations]

1 -- as for airtight multilayer plastic coating, and 4a, 4b, 4c, 4d and 4e, as for an interception plastic layer and 5, the layer of a completion container outside surface and 3 are [ the surface of a container internal surface and 7 ] smooth layers a binder layer and 6 a fiber base material wrapping layer and 2.

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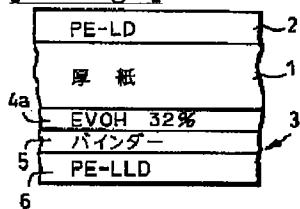
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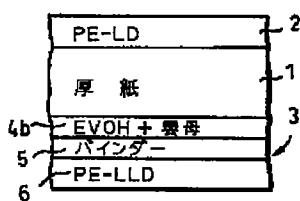
## DRAWINGS

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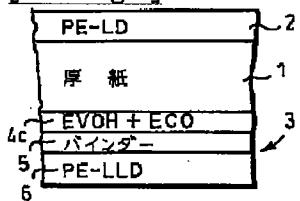
### [Drawing 1]



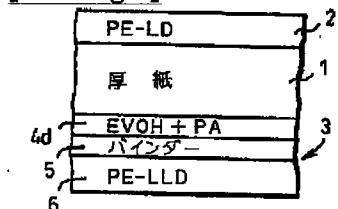
### [Drawing 2]



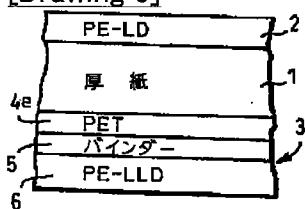
### [Drawing 3]



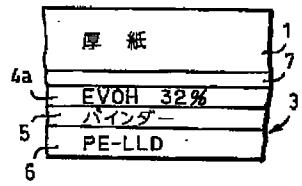
### [Drawing 4]



### [Drawing 5]



### [Drawing 6]



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[Translation done.]